What is claimed is:

1   1.   A data storage apparatus comprising:

2   at least one of a plurality of storage media;

3   a cache memory;

4   a controller operable to move data into and out of said at least one of a

5   plurality of storage media and said cache memory; said controller further operable to

6   receive data from an external source for storage; and

7   a hazard sensor; wherein

8   responsive to said hazard sensor detecting a probable occurrence of a

9   hazardous event, said controller copies data from said cache memory to said at least one

10 of a plurality of storage media.

1   2.   A data storage apparatus comprising:

2   at least one of a plurality of storage media;

3   a cache memory;

4   a controller operable to move data into and out of said at least one of a

5   plurality of storage media and said cache memory; said controller further operable to

6   receive data from an external source for storage; and

7   a hazard sensor; wherein

8   responsive to said hazard sensor detecting a probable occurrence of a

9   hazardous event, said controller copies data from said cache memory to said at least one

10 of a plurality of storage media, and said controller receiving data from said external

11 source delays sending an acknowledgment to said external source until said data is copied

12 into said at least one of a plurality of storage media.

1   3.   The data storage apparatus of claim 2, wherein:

2   responsive to said hazard sensor determining that a hazardous event is no

3   longer probable, said controller receiving data from said external source sends an

4   acknowledgment to said external source prior to copying said data into said at least one of

5   a plurality of storage media.

1   4.   A data storage apparatus comprising:

2   at least one of a plurality of storage media;

3   a cache memory;

4   a controller operable to move data into and out of said at least one of a

5   plurality of storage media and said cache memory; said controller further operable to

6   receive data from an external source for storage; and

7   a hazard sensor; wherein

8   responsive to said hazard sensor detecting a probable occurrence of a

9   hazardous event, said controller copies data from said cache memory to said at least one

10   of a plurality of storage media, and said controller receiving data from said external

11   source for storage is temporarily suspended while said controller copying said data from

12   said cache memory to said at least one of a plurality of storage media is performed.

1   5.   A data storage apparatus comprising:

2   at least one of a plurality of storage media;

3   a cache memory;

4   a controller operable to move data into and out of said at least one of a

5   plurality of storage media and said cache memory; said controller further operable to

6   receive data from an external source for storage; and

7   a hazard sensor; wherein

8   responsive to said hazard sensor detecting a probable occurrence of a

9   hazardous event, said controller copies data from said cache memory to said at least one

10   of a plurality of storage media, and said controller copying said data from said cache

11   memory to said at least one of a plurality of storage media is performed with a higher

12   priority than said controller receiving data from said external source for storage.

1   6.   A data storage apparatus comprising:

2   at least one of a plurality of storage media;

3   a cache memory;

4   a controller operable to move data into and out of said at least one of a

5   plurality of storage media and said cache memory; said controller further operable to

6   receive data from an external source for storage; and

7   a hazard sensor; and

8   a link to a remotable storage system; wherein

9   responsive to said hazard sensor detecting a probable occurrence of a

10   hazardous event, said controller copies data from said cache memory to said at least one

11   of a plurality of storage media, and wherein

12   said controller copying data from said cache memory further comprises

13   said controller copying said data over said link to said remotable storage system.

1   7.   The data storage apparatus of claim 6, wherein said controller

2   responsive to said hazard sensor detecting a probable occurrence of a hazardous event,

3   copying said data over said link to said remotable storage system is performed with a

4   higher priority than said controller copying data from said cache memory to said at least

5   one of a plurality of storage media.

1   8.   The data storage apparatus of claim 6, wherein said controller

2   responsive to said hazard sensor detecting a probable occurrence of a hazardous event,

3   copying data from said cache memory to said at least one of a plurality of storage media

4   is performed with a higher priority than said controller copying said data over said link to

5   said remotable storage system.

1   9.   A data storage apparatus comprising:

2   at least one of a plurality of storage media;

3   a cache memory;

4   a controller operable to move data into and out of said at least one of a

5   plurality of storage media and said cache memory; said controller further operable to

6   receive data from an external source for storage; and

7   a hazard sensor; and

8   a link to a remotable storage system; wherein

9   responsive to said hazard sensor detecting a probable occurrence of a

10   hazardous event, said controller copies data from said cache memory to said at least one

11   of a plurality of storage media, and said controller copying data from said cache memory

12   further comprises said controller copying said data over said link to said remotable

13   storage system, wherein

14   said controller copying said data over said link to said remotable storage

15   system is performed asynchronously, until, responsive to said hazard sensor detecting a

16   probable occurrence of a hazardous event, said controller performs said copying of said

17   data over said link to said remotable storage system synchronously.

1   10.   The data storage apparatus of claim 9, wherein

2   responsive to said hazard sensor determining that a hazardous event is no

3   longer probable, said controller switches from copying said data over said link to said

4   remotable storage system synchronously to copying said data over said link to said

5   remotable storage system asynchronously.

1   11.   The data storage apparatus of claim 1, wherein:

2   said hazard sensor detecting a probable occurrence of a hazardous event

3   includes at least one of: operation of a seismograph, recognition of an indicator of a fire,

4   operation of a smoke sensor, detection of voltage fluctuation, sensing lightening,

5   receiving public information from a meteorological agency, sensing moisture, sensing a

6   flood and receiving external attention/warning information.

1   12.   A data storage system, comprising:

2   a first data storage system, said first data storage system further

3   comprising:

4   a storage device that stores data received from a computer; and

5   a storage controller, said storage controller comprising:

6   a memory to hold said data temporarily, and

7   a recognition part to recognize a possibility of a hazard;

8   a data link; and

9   a second data storage system, connected by said data link to said first data

10   storage system;

11   wherein when said recognition part of said first data storage system

12   provides a warning of a possibility of a hazard, thereupon said storage controller of said

13   first data storage system copies data stored in said memory to said second data storage

14   system over said data link.

1   13.   The data storage system of claim 12, wherein:

2   responsive to said recognition part of said first data storage system

3   providing said warning of said possibility of a hazard, said storage controller of said first

4   data storage system switches from an asynchronous copying to a synchronous copying of

5   said data stored in said memory to said second data storage system over said data link.

1   14.   The data storage system of claim 12, further comprising:

2   a third data storage system, said third data storage system having a third

3   data storage controller; and

4   a communication link connecting said third data storage controller to said

5   data storage controller of said first data storage system; and wherein:

6   when said first data storage system and said third data storage system

7   function co-operatively, said data storage controller of said first data storage system and

8   said third data storage controller communicate with each other over said communication

9   link after recognition of a hazard of losing said data.

1   15.   A method for controlling a data storage system, said data storage

2   system comprising a storage controller, a storage device, and a memory, said method

3   comprising:

4   receiving from an external source a request to write data to said storage

5   device;

6   storing said data relating to said request within said memory;

7   reporting completion of said request to write to said external source;

8   copying said data held in said memory to said storage device;

9   responsive to recognizing a possibility of losing said data held in said

10   memory, copying any data remaining in said memory into said storage device prior to

11   accepting another request to write data from an external source.

1   16.   A method for controlling a data storage system, said data storage

2   system comprising a storage controller, a storage device, and a memory, said method

3   comprising:

4   receiving from an external source a request to write data to said storage

5   device;

6   storing said data relating to said request within said memory;

7   copying said data held in said memory to said storage device;

8   responsive to recognizing a possibility of losing said data held in said

9   memory, delaying reporting completion of said request to write to said external source

10   until completing copying any data remaining in said memory into said storage device

11   prior to accepting another request to write data from an external source.

17.   A method for controlling a data storage system, said data storage system comprising a storage controller, a storage device, and a memory, said method comprising:

receiving from an external source a request to write data to said storage device;

storing said data relating to said request within said memory;

reporting completion of said request to write to said external source;

copying said data held in said memory to said storage device;

responsive to recognizing a possibility of losing said data held in said memory, performing copying any data remaining in said memory into said storage device at a higher priority to accepting another request to write data from an external source.

18.   A control method capable of being used in a data storage system that comprises a storage controller, a storage device, and a memory, said method comprising:

receiving a request to write data to said storage device from a computer,

holding the data relating to said request within said memory,

returning a report of completion of writing to said computer,

copying said data held in said memory to a second data storage system,

recognizing a possibility of losing said held data, and

suspending temporarily receiving of said request to write from said computer if a possibility of losing said held data is recognized.

19.   A control method capable of being used in a data storage system that comprises a storage controller, a storage device, and a memory, said method comprising:

receiving a request to write data to said storage device from a computer,

holding the data relating to said request within said memory,

returning a report of completion of writing to said computer,

copying said data held in said memory to a second data storage system,

recognizing a possibility of losing said held data, and thereupon, if said possibility of losing said held data is recognized,

10   performing said copying of any un-copied data held in said memory to said

11   second data storage system prior to storing any data into said storage device.

1   20.   A control method capable of being used in a data storage system

2   that comprises a storage controller, a storage device, and a memory, said method

3   comprising:

4   receiving a request to write data to said storage device from a computer,

5   holding the data relating to said request within said memory,

6   returning a report of completion of writing to said computer,

7   copying said data held in said memory to a second data storage system,

8   recognizing a possibility of losing said held data, and thereupon, if said

9   possibility of losing said held data is recognized,

10   performing storing of any data remaining in said memory into said storage

11   device prior to copying any un-copied data in said memory to said second data storage

12   system.

1   21.   A control method capable of being used in a data storage system

2   that comprises a storage controller, a storage device, and a memory, said method

3   comprising:

4   receiving a request to write data to said storage device from a computer,

5   holding the data relating to said request to write within said memory,

6   returning a report of completion of writing to said computer,

7   copying said data held in said memory to a second storage system,

8   recognizing a possibility of losing said held data,

9   responsive to recognition of a possibility of losing said held data, copying

10   the data, requested to be written to said storage device by said computer, to said second

11   storage system; and

12   returning a report of completion of writing to said computer.

1   22.   A control method capable of being used in a remote copy system

2   that comprises a primary storage system having a primary storage controller, a primary

3   storage device, and a primary memory and a secondary storage system having a

4   secondary storage controller, a secondary storage device, and a secondary memory, said

5   method comprising:

6   receiving a request to write data into said primary storage device from a

7 computer,

8   holding the data relating to said request within said primary memory,

9   returning a report of completion of writing to said computer,

10   copying said data held in said primary memory to said secondary storage

11 system; and

12   recognizing a possibility of losing said held data, and responsive to

13 recognition of a possibility of losing said held data,

14   copying the data, requested to be written to said primary storage device by

15 said computer to said secondary storage device; and

16   returning a report of completion of writing to said computer.

1   23. The control method capable of being used in a remote copy system

2 of claim 22, wherein said copying the data, requested to be written to said primary storage

3 device by said computer to said secondary storage device after the recognition of a

4 possibility of losing said held data, further comprises:

5   detecting if un-copied data for said secondary storage system is remaining

6 in said primary memory,

7   holding the copy data which is transferred to said secondary storage

8 system and that is related to a new request to write by said computer if said un-copied

9 data is found, and

10   storing the data in said secondary memory to said secondary storage

11 device in order after receiving all said un-copied data by said secondary storage system.

1   24. The control method capable of being used in a remote copy system

2 of claim 22, wherein said copying the data, requested to be written to said primary storage

3 device by said computer to said secondary storage device after the recognition of a

4 possibility of losing said held data, further comprises:

5   detecting if un-copied data for said secondary storage system is remaining

6 in said primary memory,

7   copying the data, relating to the request to write by said computer, with an

8 indication for temporary holding to said secondary storage system

9   returning a report of completion of writing to said computer if said un-

10 copied data is found,

11   copying the data, relating to the request to write by said computer, with an

12   indication of end of temporary holding to said secondary storage system;

13   returning a report of completion of writing to said computer after

14   completion of copying said un-copied data,

15   in said secondary storage system, holding the data with said indication for

16   temporary holding and the data with said indication of end of temporary holding, relating

17   to said request to write by said computer, in said secondary memory, and

18   storing the data held in said secondary memory to said secondary storage

19   device in order.